

# **TECHNICAL CONFERENCE: DESIGN, CONSTRUCTION, & MAINTENANCE OF TRAFFIC SIGNALS AND ITS DEVICES**

**Day One (NCDOT personnel only): - TUESDAY, APRIL 10, 2007**

## **Welcome & Review of Last Meeting Minutes – Greg Fuller**

Greg briefly touched on major items of last conference held February 14-15, 2005. One of the biggest issues at that conference dealt with metal pole and metal pole foundations. We now have a statewide practice for use of metal poles for traffic signals. Greg referenced recent memo that went out from Steve Varnedoe and Kevin Lacy on February 13, 2007.

No comments were brought up with regards to the last meeting.

## **LED Signal Module Life Cycle Analysis – Milton Dean**

Milton went over background and history of LEDs for traffic signals on the North Carolina System of highways.

Future: LEDs meeting 2005 ITE Specifications will look similar to incandescent displays; cost of new heads may increase by 15 to 20%.

Questions:

Woody Meadows: (any study on how many individual LED's fail before replacing unit?) No, if it looks bad replace it.

## **Traffic Signal Equipment Issues**

### **MT-180 Conflict Monitor Testers – John Stephenson**

- MT-180 testers are no longer available.
- Manufacturer, U.S. Traffic Corporation, will no longer offer calibration services for the tester.
- Suggest you use the MT-180s until calibration expiration date.
- ATSI (Athens Technical Specialists Inc.) is offering a \$500 trade-in allowance on competitors Model MT-180; include old model number on requisition form (Note – must obtain prior approval from State Surplus)
- RGA, Inc. is the distributor for ATSI; recently quoted cost for the Model PCMT-2600 is \$10,000 plus \$500 for each cable harness assembly.
- 5.5 version of software needs to be used on new tester 2600 Series (may be downloaded from Web)
- You may obtain information booklets from John Stephenson
- R-4701 Funds can be used to secure new testers and wiring harnesses.

### **Radio upload/download – Madison Phillips**

- Radios used as a temporary communications link for cabinet locations which may be difficult to access due to proximity, weather, prevailing traffic conditions, etc.
- Radios allow technicians/engineers to perform uploads/downloads remotely from vehicle
- Range estimated at 500 to 600 yards (with cabinet door closed)

- Data transfer rate set to 9600 baud for radios as well as transceivers in cabinet
- Downloads may take up to 15 to 20 seconds longer than traditional hard-wired connections
- Dean Harris' COST Group has used these units for timing arterials
- Get model number of radios and contact information from Madison Phillips
- Vendor Information is stored in SAP system

#### **Signal Equipment Bid – Kelvin Peele**

- Bid 501051 Agency Specific Term Contract expires 9/21/08. Note: Only NCDOT can purchase equipment
- Bid 600101 Statewide Term Contract expires 3/31/08 (using 1 year extension period). Any Municipality can purchase equipment
- Bid 601011 Statewide Term expires 7/31/08
- Bid 601251 Statewide Term expires 9/30/09
- See Kelvin for equipment items and DOT numbers for each bid.
- Some Divisions have experienced problems with using the above bids.

#### **Out of Street Detection Results – Kelvin Peele / John Rowe**

- Technologies: Microwave; video
- Why alternatives: Bridge decks; construction sites; reduced maintenance
- Test Site: Centennial Pkwy and Oval Drive
- Microwave Equipment: Naztec Accuwave cost - \$2000; MS SEDCO's TC26B cost - \$500
- Sensors tested: EIS RTMS cost - \$4000; Wavetronix Smart Sensor - \$4100; Econolite Solo Pro cost for camera - \$3450 cost for Autoscope Communications Interface Panels: ACIP1 - \$585 (1 camera) ACIP4 - \$1165 (4 cameras)
- Test Results:
 

RTMS	97 - 100% accuracy
Smart Sensor	100 - 105% accuracy
Solo Pro	97 - 102% accuracy (daylight conditions)

Concerns were expressed with video detection (specifically in night, rain, fog, and other low visibility conditions).

Thanks to Division 5 and ITS & Signals Unit personnel for serving on committee.

Greg asked the group how many Divisions would like to go with all video detection. No one raised a hand.

#### **Eagle TS-2 Start Up Bug – Mark Harrison**

- News Flash sent out addressing problem
- Todd Joyce handed out copies of News Flash
- Note: Read bulletin for details/solutions

#### **NC One Call – Ron Fairbanks**

“Damage prevention is a shared responsibility”

David West (NCDOT) is a Member of Board of Directors (21 member board)

1-800-632-4949 One Call Center (call at least 2 days before needed)

Notify utility owner if a facility is hit, even if no damage; in case of gas call 911

Adhere to color code scheme developed for utility locations.

Positive Response: system that will allow participating facility owners status of dig tickets.

[www.ncocc.org](http://www.ncocc.org) (One Call web-site)

811- Call Before You Dig. In August, 2006, the North Carolina Public Utilities Commission directed conversion to 811 system by 4/13/07 per FCC ruling.

Divisions 3 & 13 are current members. Clyde Mauney in Division 12 expressed interest in joining.

59¢/Ticket to NC One Call

Mapping system needs to be updated to cut down on unnecessary locate requests (“wild goose chases”). Anyone performing locates needs to let NC One Call know if a large amount of unnecessary tickets are coming in

### **Use of Backplates – Greg Fuller**

See Powerpoint for additional minutes

No requirements for use of backplates is shown in the ITS & Signals Design Manual

Bottom line is to follow plans and stay consistent from one intersection to the next along the same corridor

### **Performance Management, System’s Operation Along Strategic Highway Corridors – Greg Fuller and Kelly Damron**

Levels of services were defined and what needs to be accomplished on Strategic Highway Corridors

3 Types of Signal Performance Measures - Signal Systems Evaluations, Preventative Maintenance and Emergency Maintenance

Incidents cause 60% of all delays and recurring congestion makes up remaining 40% of delays.

Need to optimize signals on arterials when traffic is detoured onto them from freeway closures.

Need to fill out Secretary’s Survey and voice your honest opinion to address needs

### **Division Traffic System – Mike Brown**

Maintenance Tracking System has been revised.

Divisions 1, 3, 6 will be first Divisions to try software/program before sending to all Divisions

### **Railroad Preemption Inspections – Rob Ziemba**

Handed out revised/proposed Railroad inspection form.

The form will be available for download from the ITS & Signals Web Site by end of June.

Goal is to for all Divisions to use the form beginning July 1, 2007.

Rob discussed changes with attendees.

### **Division 2 Special Equipped Signal System Van – Tim Bell**

- Van was observed by participants and Tim Bell stated that it is a good tool to assist people in accomplishing job more efficiently

## **Open Discussion - All**

- Ross Kimbro – What is status of updates to Function Codes (specifically with regards to locates) Answer – Asset Management Unit has been informed of proposed changes and status is on hold until further notice
- Durwin Rice – Career Banding and upgrading Signal Technicians
- Clyde Mauney – placement of cabinets on plans by PEFs (can't be installed where shown)
- John Rowe (Watch-Dog Timer): Lexington – voltage monitoring devices installed to try and determine cause. Call or e-mail John Rowe with problem locations. Rudy Bachelor had locations in Wilson with voltages were high and low that caused “Watch Dog Timer” problems. After power was corrected, problem went away.
- Greg Fuller – Disconnects: Use maintenance money to install them at locations without disconnects if no upgrades are scheduled in the immediate future.
- Marty Headen – installing service that doesn't meet code, installation by contractor.
- Pam Alexander – will have funds for signal head upgrade – possibly.
- Question concerning combination meter/disconnect joint boxes not being on the OPL and there are problems with cables being run in same raceway.
  - Update since Meeting: 2 pedestal mounted meter base/disconnects have now been put onto QPL.

## **Day 2 - WEDNESDAY, APRIL 11, 2007**

### **Welcome and Introductions – Greg Fuller**

### **Working Safely Near High Voltage Power Lines – Larry Purvis**

Gary Phillips, Division 8 – Static Electricity from overhead transmission lines at two locations interfering with work.

- Mark Jackson, Safety Engineer – was informed the static electricity is a problem in Divisions other than Division 8. Division 1 has 9 locations; Division 12 has 10 locations; Division 10 has 1 location. Mark Jackson is developing a Safe Operating Procedure.
- Safety and Loss will research and address the static issue
- Division 3 experienced a different problem with a location using span-wire, but overcame with additional grounding and bonding.

### **OASIS Software Update – Mark Harrison**

Mark Harrison – Oasis Enhancements Handout given on Enhancements and power point presentation used.

- See Powerpoint for additional minutes
- Oasis Software Version currently – 3.00.92
- Revised Oasis Software Version currently being reviewed by Mark Harrison and others, hopefully will be available by September 2007.

## **Innovative Signal Design Features**

### **Flashing Yellow Arrow Display – Greg Fuller**

- See Powerpoint for additional minutes
- NCDOT implemented locations: 9 sites see power point for specific intersections

- Public Service announcement available for publication in the local paper by the Division when implementing 4 Section Protected Permissive Flashing Yellow Arrow Traffic Signal Head.
- Have used in both NEMA TS-1 and 2070 Applications.

#### **Red Revert for Backup Protection – Todd Joyce**

- Todd explained what the Yellow Trap was and provided a good animation of what could possibly occur at an intersection where a Yellow Trap occurs.
- Todd provided a history of treatments that have been done over the years: eg., phase omits, dummy phases, forcing controller through side street, etc.
- There is much lost time that occurs when backing up to the protected phase of a protected/permitted left turn.
- By using the Red Revert feature, the safety provided by the elimination of the Yellow Trap doesn't adversely compromise efficiency of the traffic signal operation.

### **Traffic Signal Equipment Items**

#### **#18 AWG Lead-In Cable – Milton Dean**

- #18 AWG lead in cable – power point presentation
- #14 AWG cable (DOT Part # 06-03110) is working with no reported problems
- Problems with new 18 AWG 2 pair with overall shield (DOT #106003115) - Divisions 12, 13, and Pat Gray have experienced problems
- Milton will review specifications and various manufacturers' wire samples to determine source of problems and a potential solution.
  - Update since Meeting: Decision was made to revert to 14-2 AWG single pair due to consistent better quality of cable being received.

#### **Inductive Loop Installation Details – Milton Dean**

- Drawings will be revised on construction methods
- See Greg Fuller for decision on installation methods: 3m brand sealing method
  - Update since Meeting: Revised drawings were sent out for comments to each Division due back on May 18, 2007. Updated drawings are forthcoming and should be available in the near future.

#### **Fiber Optic Cable Preventative Maintenance – Ted Faulkner**

- Jumpers are the main key to consistent, reliable fiber optic communications. When doing PMs, need to ensure integrity of F.O. jumpers.

#### **Wireless Communication Update – Neil Avery**

46 locations now running with radio communications

Encom 5100 radio model on Annual Bid provides for connection to both fiber optic and copper systems.

21 locations in Jacksonville with 2 more on schedule for interconnection. No problems known of as to date.

Training for Encom Radios was provided in February

## **2006 Standard Specifications & Project Special Provisions – Pam Alexander**

- Question and answer session with a committee of Technicians and Contractors serving.
- See web site for questions/answers from the “Specifications Game”.

## **Traffic Signal Items**

### **Daylight Savings Time Revision – Milton Dean**

- 8/8/05 President Bush signed the Energy Policy Act of 2005.
- Milton gave a current status.
- All Divisions were able to implement the change and no major issues have resulted.

### **Bolt Tightening on Metal Poles – Steve Walton**

- No relation between tension and torque.
- DTI's – why and how to use.
- Steve Walton is available to assist in installation test procedures.
- DTI's are required on mast arms, need to keep nuts lubricated.

Update to Use of DTI's since Meeting:

On 5/21/07, a Group from Signals and Geometrics met to discuss use of DTI's on the arm to pole connection for mast arm poles. It was decided that the disadvantages of DTI's outweighed the advantages. Subsequently, it was decided that ITS & Signals would remove the requirement for DTI's on the arm to pole connection for the following reasons:

- Most Resident and Division staff are not enforcing their installation
- Structure Design Unit does not support their use for signal poles. (SDU did not even realize the 2000 standards they developed required DTI's)
- No history of arm connection problems without DTI's.
- To our knowledge, no other states have this requirement
- At least one fabricator does not support the use of DTI's (might not guarantee poles with DTI's)

This change will bring consistency to mast arm installations across the state. If future research demonstrates benefits of DTI's, we will reconsider our position at that time.

## **Traffic Signal Practices – Greg Fuller**

### **Plan-Of-Record**

Original copies maintained in Signals and Geometrics file room

Handed out copy of Traffic Engineering Policies, Practices and Legal Authority Resources (TEPPL) T-67

### **Provisions for Generator Power at Traffic Signals**

Municipal locations only

Handed out copy of TEPPL T-68

Very strict NESC and NEC requirements  
Transfer switches imperative to protect Power Company employees

### **Selection of Metal Poles for Traffic Signals**

A standard practice was developed to provide guidance in the selection of metal poles at signalized intersections.

Handed out copy of TEPPL T-32

### **Luncheon Speaker – Lacy Love**

- LED's have reduced maintenance and electrical cost.
- Performance Measures – need to run like you would a business so we can document to our stake holders what we're doing and funding needed to accomplish defined goals.
- Long Term – more efficient operation and maintenance.
- Short Term – hopefully Legislature will give some more money for maintenance.
- Signal Timing – definitely need for.
- Increasing population and increasing congestion.
- Durwin Rice – retainage of employees is a problem due to salaries and no chance for advancement.
- Standby Pay – personnel manual and adhere to policy (Statewide).
- Competency Based Pay Program – funding put on hold for awhile for new competencies.
- Contracting out maintenance is a “real possibility”.
- Interstate Maintenance Pilot Program will take place in Division 10 & 12 using Performance Measured specs defined by NCDOT.

### **Signal Inspection Checklist on Construction Projects – Greg Fuller**

- 12/5/05 checklist sent out from Chief Engineers Office.
- 8 of 14 Divisions are using – 6 Divisions are not.
- Contractors aware of checklist.
- Need to record name, date, work performed anytime you go in the cabinet (everyone; NCDOT personnel; Contractors, etc.)
- Fuller to determine how long log books are to be retained.

### **Traffic Signal Items (Continued)**

#### **R-4701 Annual Report FY06 – Greg Fuller**

- See Powerpoint for additional minutes

#### **Upcoming Signal System Projects – Greg Fuller**

- Wilmington: October, 2008
- Chapel Hill: April, 2009
- Goldsboro: Currently showing in STIP for construction in Federal Fiscal Year 2011 but good chance it may be accelerated.

#### **Access of Traffic Signal Cabinets – Greg Fuller**

- Red Log Books should be located in each signal cabinet. Every time the cabinet door is opened, it becomes imperative to sign off in the log book to detail any activities taking place.

### **Open Discussion – All**

- Meter Base/disconnect: Service entrance and feeder conductors must be physically separated to meet National Electrical Code. “Pedestal Type” – need to look at.
- Terry Spell – loop installation technique, how will this be depicted on new drawings? Drawings are forthcoming. See comments from Milton Dean’s presentation on Inductive Loop Installation Details.
- LED’s – new ITE Specs out. Manufacturers need to meet. Bids are out for such and will be opened 4/12/07.
- QPL Items – approved by date of installation vs date of bid. Date of installation is now the method used in Standard Specs.
- Metal Pole Mast Arms – arm not fitting snugly due to galvanization.
- R/W Utilities – issues with utility not being relocated and holding up signal Contractors.

### **Update Item not discussed at Meeting**

Future lettings of larger traffic signal projects for Metropolitan Signal Systems, the ITS & Signals Unit has implemented changes to the Project Special Provisions. The Contractors' attention is directed to the fact that certain items related to the signal system communications infrastructure, system hardware, cabinets, controllers, system software, and related system equipment/materials will be paid for as a percentage of the unit bid price for that item upon acceptance of the item. The remaining percentage of the unit bid price for each item will be paid following the final acceptance of the integrated system (including completion of the Observation Period).